CLAIMS

What is claimed is:

1. A method of operating a communications node comprising a service framework, a service-requesting entity, and a service, the method comprising:

the service-requesting entity requesting the service framework to provide access to the service; and

the service framework providing the service-requesting entity with access to the service.

2. The method recited in claim 1, wherein in requesting, the service-requesting entity provides a service type to the service framework.

3. The method recited in claim 2, wherein the service framework only locates and connects with services having the service type.

4. The method recited in claim 1, wherein in requesting, the service-requesting entity provides at least one service attribute to the service framework.

5. The method recited in claim 4, wherein the service framework only locates and connects with services having the at least one service attribute.

6. The method recited in claim 1, wherein the service-requesting entity resides on the communications node, and the service resides elsewhere, and wherein the communications node further comprises a connection manager service to notify the service framework when the communications node is in proximity to a remote communications node on which the service may reside.

7. The method recited in claim 1, wherein the service-requesting entity resides on the communications node, wherein the communications node comprises a wireless interface to which a remote communications node can be coupled, wherein

the service resides on the remote communications node, and wherein the communications node further comprises a connection manager service to notify the service framework when the communications node is communicating with the remote communications node via the wireless interface.

8. The method recited in claim 7, wherein the service framework comprises a proximity daemon responsive to the connection manager service, the method further comprising:

the proximity daemon creating a remote lookup service frontend when the service framework is notified by the connection manager service;

the remote lookup service frontend broadcasting a search for a remote lookup service backend; and

if a remote lookup service backend is found, the remote lookup service frontend communicating with the remote lookup service backend.

9. The method recited in claim 8 wherein in communicating, the remote lookup service frontend and remote lookup service backend determine whether they are compatible.

10. The method recited in claim 9, wherein the service framework further comprises a remote lookup daemon, the method further comprising:

if the remote lookup service frontend and remote lookup service backend are compatible, the remote lookup service backend determines whether a service backend corresponding to the service resides on the remote communications node; and

if so, the remote lookup service backend passes parameters to the remote lookup daemon.

11. The method recited in claim 10, the service framework further comprising a service frontend and a service registry, the method further comprising:

the remote lookup daemon passing the parameters to the service frontend; and

the service frontend registering the service in the service registry.

12. The method recited in claim 11, the service framework further comprising a service event notification registry;

the service-requesting entity registering a notification request for the service in the service event notification registry;

the service framework determining whether the service event notification registry contains a notification request registered by the service-requesting entity for the service; and

if so, the service framework notifying the service-requesting entity of the service, and the service-requesting entity invoking the service.

13. The method recited in claim 12, the method further comprising:

the service frontend communicating with the service backend to provide the service to the service-requesting entity.

14. The method recited in claim 7, wherein the service framework comprises a service frontend and a remote service event notification registry, and wherein the service framework further comprises a proximity daemon responsive to the connection manager service, the method further comprising:

the service frontend registering a notification request for a service backend in the remote service event notification registry;

the proximity daemon creating a remote lookup service frontend when the service framework is notified by the connection manager service;

the remote lookup service frontend determining whether the remote service event notification registry contains a notification request for the service backend registered by the service frontend;

if so, the remote lookup service frontend requests a remote lookup service backend on the remote communications node to determine whether the service backend is on the remote communications node;

if so, the remote lookup service backend obtains parameters necessary for the service frontend to communicate with the service backend; and

the remote lookup service backend communicates the parameters to the remote lookup service frontend.

15. The method recited in claim 14, wherein the service framework further comprises a service event notification registry, the method further comprising:

the service frontend registering the service with the service framework;

the service framework determining whether the service event notification registry contains a notification request registered by the service-requesting entity for the service; and

if so, the service framework notifying the service-requesting entity of the service, and the service-requesting entity invoking the service.

16. The method recited in claim 15, the method further comprising:

the service frontend communicating with the service backend to implement the service invoked by the service-requesting entity.

17. A computer-readable medium containing computer instructions for instructing a processor to perform a method of operating a communications node comprising a service framework, a service-requesting entity, and a service, the instructions comprising:

the service-requesting entity requesting the service framework to provide access to the service; and

providing the service-requesting entity with access to the service.

18. The computer-readable medium recited in claim 17, the instructions further comprising:

in requesting, the service-requesting entity provides a service type to the service framework; and

the service framework only locates and connects with services having the service type.

19. The computer-readable medium recited in claim 17, the instructions further comprising:

in requesting, the service-requesting entity provides at least one service attribute to the service framework; and

the service framework only locates and connects with services having the at least one service attribute.

20. The computer-readable medium recited in claim 17, wherein the service-requesting entity resides on the communications node, and the service resides elsewhere, and wherein the communications node further comprises a connection manager service, the instructions further comprising:

the connection manager service notifying the service framework when the communications node is in proximity to a remote communications node on which the service may reside.

21. The computer-readable medium recited in claim 17, wherein the service-requesting entity resides on the communications node, wherein the communications node comprises a wireless interface to which a remote communications node can be coupled, wherein the service resides on the remote communications node, and wherein the communications node further comprises a connection manager service, the instructions further comprising:

the connection manager service notifying the service framework when the communications node is communicating with the remote communications node via the wireless interface.

22. A communications node comprising:

a processor;

a wireless interface coupled to the processor to enable the communications node to communicate with a remote node; and

a memory coupled to the processor and comprising:

a service-requesting entity; and

a service framework to discover a service requested by the service-requesting entity, the service being on the remote node, and to connect the service-requesting entity with the service.

23. The communications node recited in claim 22 wherein the memory further comprises a connection manager service to notify the service framework when the communications node is in proximity to the remote node.

24. The communications node recited in claim 23 wherein the service framework comprises a proximity daemon to create a remote lookup service frontend when the service framework is notified by the connection manager service, the remote lookup service frontend to look for a remote lookup service backend on the remote node.

25. The communications node recited in claim 24 wherein the service framework further comprises a first program module to determine whether the remote lookup service frontend is compatible with the remote lookup service backend.

26. The communications node recited in claim 25 wherein the service framework further comprises a second program module, responsive to the first program module, to determine whether a service backend corresponding to the service resides on the remote node.

27. The communications node recited in claim 26 wherein the service framework further comprises a remote lookup daemon, responsive to the second program module, to obtain parameters from the service backend to the remote lookup daemon.

28. The communications node recited in claim 27 wherein the service framework further comprises:

a service frontend responsive to the remote lookup daemon to receive the parameters; and

a service registry in which the service frontend registers the service.

29. The communications node recited in claim 28 wherein the service framework further comprises a service event notification registry in which a notification request can be registered by the service-requesting entity.

30. The communications node recited in claim 29 wherein the service framework further comprises a third program module to determine whether the service event notification registry contains a notification request registered by the service-requesting entity.

31. The communications node recited in claim 30 wherein the service framework further comprises a fourth program module, responsive to the third program module, to notify the service-requesting entity of the service.

32. The communications node recited in claim 31 wherein the service-requesting entity, responsive to the fourth program module, invokes the service.

33. The communications node recited in claim 32 wherein the service frontend communicates with the service backend to implement the service invoked by the service-requesting entity.

34. The communications node recited in claim 28 wherein the service framework further comprises a remote service event notification registry in which a notification request for a service backend can be registered by the service frontend

35. The communications node recited in claim 34 wherein the remote lookup service frontend determines whether the remote service event notification registry contains a notification request for a service backend registered by the service frontend.

36. The communications node recited in claim 35 wherein the remote lookup service frontend requests a remote lookup service backend on the remote node to determine whether the service backend is on the remote node.

37. The communications node recited in claim 36 wherein the remote lookup service backend obtains parameters necessary for the service frontend to communicate with the service backend.

38. The communications node recited in claim 37 wherein the remote lookup service backend communicates the parameter to the service frontend.

39. The communications node recited in claim 38 wherein the service frontend registers the service with the service framework.

40. The communications node recited in claim 39 wherein the service framework determines whether the service event notification registry contains a notification request registered by the service-requesting entity for the service.

41. The communications node recited in claim 40 wherein the service framework notifies the service-requesting entity of the service, and the service-requesting entity invokes the service.

42. The communications node recited in claim 41 wherein the service frontend communicates with the service backend to implement the service invoked by the service-requesting entity.

43. A communications system comprising:

at least one remote node; and

at least one communications node comprising:

a processor;

a wireless interface coupled to the processor to enable the at least one communications node to communicate with the at least one remote node; and

a memory coupled to the processor and comprising:

a service-requesting entity; and

a service framework to discover a service requested by the service-requesting entity, the service being on at least one remote node, and to connect the service-requesting entity with the service.

44. The communications system recited in claim 43 wherein the memory further comprises a connection manager service to notify the service framework when the communications node is in proximity to at least one remote node.

45. The communications system recited in claim 44 wherein the service framework comprises a proximity daemon to create a remote lookup service frontend when the service framework is notified by the connection manager service, the remote lookup service frontend to look for a remote lookup service backend on the at least one remote node.

46. The communications system recited in claim 45 wherein the service framework further comprises a first program module to determine whether the remote lookup service frontend is compatible with the remote lookup service backend.

47. The communications system recited in claim 46 wherein the service framework further comprises a second program module, responsive to the first program module, to determine whether a service backend corresponding to the service resides on the at least one remote node.

48. The communications system recited in claim 47 wherein the service framework further comprises a remote lookup daemon, responsive to the second program module, to obtain parameters from the service backend.

49. The communications system recited in claim 48 wherein the service framework further comprises:

a service frontend responsive to the remote lookup daemon to receive the parameters; and

a service registry in which the service frontend registers the service.

50. The communications system recited in claim 49 wherein the service framework further comprises a service event notification registry in which a notification request can be registered by the service-requesting entity.

51. The communications system recited in claim 50 wherein the service framework further comprises a third program module to determine whether the service event notification registry contains a notification request registered by the service-requesting entity.

52. The communications system recited in claim 51 wherein the service framework further comprises a fourth program module, responsive to the third program module, to notify the service-requesting entity of the service.

53. The communications system recited in claim 52 wherein the service-requesting entity, responsive to the fourth program module, invokes the service.

54. The communications system recited in claim 53 wherein the service frontend communicates with the service backend to implement the service invoked by the service-requesting entity.

55. A method of discovering a service on a communications node, wherein the communications node comprises a service-requesting entity and a service registry, the method comprising:

the service-requesting entity constructing a service template representing a desired service, the service template comprising a service type;

the service-requesting entity issuing the service template to the service registry; and

if the service registry has service objects matching the service template, the service registry returning to the service-requesting entity an array of such service objects.

56. The method recited in claim 55, wherein the communications node further comprises an interface to which a remote communications node can be coupled, a service frontend, and a remote services event notification registry, and wherein the service resides on the remote communications node, the method comprising:

the service frontend registering a notification request for a service backend in the remote service event notification registry.

57. The method recited in claim 56, in which the remote communications node comprises a service backend corresponding to the service, the method comprising:

obtaining parameters from the service backend necessary for the service frontend to communicate with the service backend.

58. The method recited in claim 57, the method comprising:

communicating the parameters to the service frontend.

59. The method recited in claim 58, the method comprising:

the service frontend communicating with the service backend to provide the service to the service-requesting entity.

60. The method recited in claim 55, wherein the service template comprises at least one service attribute.